UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE: August 28, 2018

SUBJECT: Request for Concurrence on Proposed Nationally Significant or Precedent-Setting Removal at the Tronox Mesa V Haul Shaft Site, Cove, Arizona, Navajo Nation Indian Reservation

FROM: Enrique Manzanilla, Director
Superfund Division (SFD)

Partnership, Land Revitalization & Cleanup Branch, Region 9

TO: Reggie Cheatham, Acting Director
Office of Emergency Management

The purpose of this memorandum is to request your concurrence on the proposed time-critical removal action at the Tronox Mesa V Haul Shaft Site, Cove, Arizona, Navajo Nation Indian Reservation. Redelegation of Authority in R-14-2 gives the Director of the Office of Emergency Management the authority to concur on nationally significant or precedent-setting removals.[1] This removal action is estimated to cost $186,000 in direct extramural expenditures and to take 6 months. As a result, contingent upon your concurrence, I will approve the Action Memorandum in order to avert the ongoing exposures to unsafe levels of uranium contamination that are occurring at the Site.

Region 9 staff for the Tronox Mesa V Haul Shaft Site has discussed this proposed removal with staff for the Office of Emergency Management's Preparedness and Response Operations Division (PROD). PROD has advised that this removal is considered nationally significant or precedent setting because it is a removal of radioactive mining waste from a site located in Indian country. As has been the case with all of Region 9's uranium waste removal actions on the Navajo Nation, Region 9 has conducted extensive government to government consultation with the Navajo Nation and community involvement activities with local residents regarding the Tronox Mesa V Haul Shaft Site and the proposed removal action.

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[1] See September 2009 Superfund Removal Guidance on Preparing Actions Memoranda ("2009 Guidance"), removals in Indian Country generally require OEM concurrence (see p. 45).

The proposed removal action would mitigate the exposure to the release or threat or release of hazardous substances that is causing a threat to public health or welfare or the environment by taking steps to prevent exposure to the radon gas located in the Tronox Mesa V haul shaft. EPA and Navajo Nation has received information indicating that Navajo residents and livestock may be utilizing this haul shaft as temporary shelter. The proposed action would post signs warning the public/community of the hazards associated with entering the Site and construct a physical barricade designed to prevent entry into the haul shaft. The action is expected to take approximately 6 months.

The Tronox Mesa V haul shaft Action Memorandum is attached for your review. My approval awaits your concurrence.

Concur:

Rebecca Clark 10/18/18

for Reggie Cheatham, Acting Director
Office of Emergency Management
Date

According to the redelegation, authority to non-concur remains with the Assistant Administrator. If you choose not to concur on this action, please forward this memorandum to the Assistant Administrator.

Non-Concur:

Reggie Cheatham, Acting Director
Office of Solid Waste and Emergency Response
Date

Attachment A:
Action Memorandum: Request for a Time-Critical Removal Action at the Tronox Mesa V Haul Shaft Site, Cove, Arizona, Navajo Nation Indian Reservation

cc: Gilberto Irizarry, U.S. EPA, OEM, HQ
Jean Schumann, U.S. EPA, OEM, HQ

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The Tronox Mesa V haul shaft Action Memorandum is attached for your review. My approval awaits your concurrence.

Concur:

_____

Reggie Cheatham, Acting Director Date
Office of Emergency Management

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Non-Concur:

_____

Reggie Cheatham, Acting Director Date
Office of Solid Waste and Emergency Response

Attachment A:
Action Memorandum: Request for a Time-Critical Removal Action at the Tronox Mesa V Haul Shaft Site, Cove, Arizona, Navajo Nation Indian Reservation

cc: Gilberto Irizarry, U.S. EPA, OEM, HQ
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MEMORANDUM

DATE:

SUBJECT: Request for a Time-Critical Removal Action at the Tronox Mesa V Haul Shaft Site, Cove, Arizona, Navajo Nation Indian Reservation

FROM: Kenneth B. Rhame, On-Scene Coordinator
Chip Poalinelli, Remedial Project Manager
Tribal Lands Clean-Up Section (SFD 6-2)

THROUGH: Will C. Duncan, III, Assistant Director (SFD-6) w/o III

TO: Enrique Manzanilla, Director
Superfund Division (SFD)

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval to spend up to $186,000 in direct extramural costs to mitigate threats to human health and the environment posed by a release into the environment of hazardous substances at the Tronox Mesa V Haul Site (the Site) located in Cove, Apache County, Arizona. The Site consists of an open mine haul shaft that is accessible by the public and livestock (cattle). U.S. EPA and the Navajo Nation are concerned that unrestricted access to the Site poses an exposure and health risk to the public that may utilize this haul shaft as temporary shelter. Hazardous substances at the Site include a pile of uranium mining waste rock that is emanating radon at 81.9 picocuries per liter (pCi/L), which is twenty times the residential-specific dose action level of 4.0 pCi/L.

If approved, this Action Memorandum will serve to document the authorization of expenditures required for U.S. EPA to take the actions described herein to address a release, or threat of release, of hazardous substances that pose a danger to human health and the environment. The proposed time-critical removal action would be undertaken pursuant to Section 104(a)(1) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9604(a)(1), and Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR § 300.415

II. SITE CONDITIONS AND BACKGROUND

Site Status: Non-NPL
Category of Removal: Time-Critical
CERCLIS ID:

SITE ID: A9BJ

A. Site Description

1. Physical Location

The Site is located within the Navajo Nation Indian Reservation in Arizona. The Site is located in the Cove Mesa, Apache County, Arizona; above the Navajo Nation Chapter known as Cove (See Attachment II).

2. Site Characteristics

Portions of the Navajo Nation are located on geologic formations rich in radioactive uranium ores. Beginning in the 1940s, widespread mining and milling of uranium ore on Navajo Nation tribal lands for national defense and energy purposes led to a legacy of abandoned uranium mine (AUM) sites. The Site is believed to have been used as part of the Tronox Mesa V Mine Site operation. The Tronox Mesa V mine site is classified as tribal trust land. Historical documents indicate that the operator of Tronox Mesa V mine was Kerr-McGee from 1953 to 1955. No other historical ownership / lease information has been identified. The Tronox Mesa V haul shaft appears to be a man-made opening that was accessed by the mining company to transport uranium ore from the Tronox Mesa V mine site. U.S. EPA and the Navajo Nation are concerned that unrestricted access to the Site may be a potential public/human exposure pathway to radon gas released into the environment from exposed uranium ore and waste. The Tronox Mesa V haul shaft consists of a short passageway to a small excavated room approximately 16 feet by 20 feet with a ceiling height of approximately 10 feet. Just inside the haul shaft is a vertical shaft that extends up toward the surface of the mesa. There is a large pile of rock and sand just inside the entrance and below the vertical shaft. The shaft is estimated to extend upward approximately 100 feet.

3. Removal Site Evaluation

During the summer and fall of 2015 the U.S. EPA and their contractors (START) completed the Mine Category Assessment Protocol (MCAP) project to identify sites requiring time-critical actions and prioritize other sites for Removal Site Evaluations. The project entailed reconnaissance efforts within a 180-square mile area containing 120 mine claims. The purpose of the MCAP project was to develop and implement a systematic method for assessing and surveying abandoned uranium mine sites and other potential contributions of uranium material areas to assist ranking areas for Removal Site Evaluations. The MCAP report identifies the Site as "Tronox Mesa V Mine" and gives the Site the highest priority for further investigation (see Mine Category Assessment Protocol (MCAP) Summary Report Navajo Nation, Apache County, Arizona in Attachment IV). During the week of June 18-23, 2017, representatives from the National Center for Radiation Field Operations (NCRFO), on behalf of U.S. EPA, monitored the ambient levels of radon gas at the Site, inside and at the entrance of the Tronox Mesa V haul shaft. Three calibrated Saphymo AlphaGuard passive radon monitors were placed at two different locations within the haul shaft and left to measure radon concentrations, statistical measurement error, temperature, pressure and humidity

at 10-minute intervals for a period of 72 hours. One sampler was placed approximately 30 feet inside the haul shaft entrance near the top of the debris pile, the other two samplers were co-located inside and toward the rear of the inner chamber and were placed six feet apart and oriented in different directions. The results are illustrated in the tables below.

Table 1. Interior Room ^{222}Rn Measurements (co-located AlphaGUARDS)

	Average (pCi/L)	Std. Dev. (pCi/L)	Min. (pCi/L)	Max. (pCi/L)	Screening Level (pCi/L)
SN 1147 - All Data Points	80.5	9.0	30.9	106.6	4.0
SN 1147 - Minus First 4 hrs.	81.9	9.2	59.2	106.6	
SN 1036 - All Data Points	79.4	9.0	15.5	104.2	
SN 1036 - Minus First 4 hrs.	80.5	9.2	63.0	104.2	

Table 2. Haul Shaft Entrance Rn-222 concentration over time

	Average (pCi/L)	Std. Dev. (pCi/L)	Min (pCi/L)	Max (pCi/L)	Screening Level (pCi/L)
All Data	3.15	0.97	0.41	10.43	4.0

The radon sampling results from the rear interior room of the Tronox Mesa V haul shaft were approximately twenty times the screening level of 4 pCi/L. The screening level is the U.S. EPA action level for radon gas in residential scenarios. The residential screening level was selected because of evidence that the haul shaft has been used by herders and trespassers as shelter. The average concentration of radon gas measured from the rear interior room was approximately 80 pCi/L; the highest concentration measured was 106.6 pCi/L. These results indicate that uranium waste rock located within the Tronox Mesa V haul shaft related to the uranium mining operation poses an exposure and health risk to the public that may utilize this haul shaft as temporary shelter. There is also a threat of release into the environment because of radon progeny's charged state and solid nature, they rapidly attach to clothing and can be transported outside of the haul shaft by trespassers. The report, Tronox Mesa V Radon Sampling Project, dated July 7, 2017, is provided as part of the administrative record for this action memo (see Attachment III).

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Uranium Waste

Uranium mining at the Site resulted in releases of uranium and progeny, such as radon, to the environment. Uranium and radon are CERCLA hazardous substances, listed in the National Contingency Plan at Appendix B to 40 C.F.R. Section 302.4 (Radionuclides). Based on field observations and the radon assessment data collected, it is evident that mining waste containing hazardous substances is present at the Site and poses a threat of release into the environment. As noted above, because of radon progeny's charged state and solid nature, they rapidly attach to clothing and can be transported outside of the haul shaft by trespassers. It is known that people in the Cove Community and their livestock frequent the haul shaft.

5. NPL status

The Site is not on the National Priorities List (NPL) nor is it proposed to be on the NPL. Current conditions at the Site pose an imminent and substantial endangerment (see Sections III and IV) to the surrounding community that enter the haul shaft seeking shelter. The proposed removal action will not complete all work at the Site but is intended as an interim action that will restrict access until a final action is selected and implemented.

B. Other Actions to Date

No other response actions have occurred at the Site to date.

C. State and Local Authorities' Roles

1. State and local actions to date

No state or tribal actions have taken place at the Site. Formal consultations with the Navajo Nation for a broad range of AUM-related issues have been ongoing for several years. Formal consultation for this removal action have been initiated with the Navajo Abandoned Mine Lands Program (AML). These discussions constitute state and tribal consultation.[1]

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Current Site conditions include ongoing releases into the environment and the threat of future releases of hazardous substances, namely: uranium and its progeny (i.e., radium-226) and ionizing gamma and alpha radiation associated with that progeny. The likelihood of direct human exposure, via ingestion and/or close proximity to the hazardous substances, and the threat of future releases and migration of those substances, pose an imminent and substantial endangerment to public health or welfare or the environment based on the factors set forth in the NCP, 40 CFR § 300.415(b)(2).

These factors include:

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[1] EPA Policy on consultation and coordination with Indian Tribes, May 4, 2011. See http://www.epa.gov/tp/pdf/cons-and-coord-with-indian-tribes-policy.pdf

1. Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants or contaminants

As described in Section II.A.4, elevated levels of radon related to historical uranium mining operations have been detected inside at the Site. U.S. EPA has determined that the unrestricted access and part-time occupants of the haul shaft risk elevated exposure to radon, at levels greater than U.S. EPA residential screening levels and health risk thresholds. These exposures pose an unacceptable excess cancer risk.

The U.S. EPA has set a guideline for radon in air inside homes of 4 picocuries per liter (4 pCi/L) of air. Persons exposed to radon concentrations greater than 4 pCi/L also face increased cancer risks. Radon is a naturally occurring radioactive gas that is formed from the radioactive decay of uranium. Indoor radon levels are affected by the radium and uranium levels in soil, the porosity of the soil, and the ventilation rate of the room. People exposed to high levels of radon have an increased incidence of lung cancer (ATSDR 1999b). U.S. EPA's use of area-specific background levels is intended to verify that removal actions are taken in response to mine-related releases of radiation, rather than naturally-occurring radiation in area soils.

The Tronox Mesa V haul shift was used to support uranium mining in the vicinity of the Site. Uranium is found in small amounts in most rocks and soil. It slowly breaks down to its progeny including radium and radon. Radium and radon enter the environment from the soil, and from uranium mines and sometimes other types of mines. Uranium occurring in a subsurface vein is brought to the surface during mining activities. Thorium is also often present in uranium ore.

The elevated radon levels at the Site are likely to result in human exposure via inhalation. Persons occupying, traversing the Site or seeking temporary shelter may be exposed to elevated radon via inhalation.

One of the radioactive properties of uranium is its half-life, or the time it takes for half of the isotope to give off its radiation and change into another substance. The half-life of uranium is very long (between 200,000 years and 5 billion years). This is why uranium still exists in nature and has not all decayed away and does not itself emit high levels of ionizing radiation. Inhalation and ingestion of uranium can result in kidney damage. The radiation damage from exposure to high levels of natural uranium is not known to cause cancer (ATSDR 1999c).

Radium is formed when uranium and thorium break down in the environment. Two of the main radium isotopes found in the environment are radium-226 and radium-228. During the decay process, alpha, beta, and gamma radiation are released. Radium may be found in air and water. Radium in the soil may be absorbed by plants.

Acute inhalation exposure to high levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). It also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The BEIR V report has also stated that radium is a known human carcinogen (ATSDR, 1999a). Inhalation of radium contaminated particulates is of particular concern. Radium emits alpha radiation,

which, when inhaled, becomes a source of ionizing radiation in the lung and throat, possibly leading to toxic effects (See ATSDR ToxFAQ Attachment V).

2. The availability of other appropriate federal or state response mechanisms to respond to the release

Navajo Nation EPA has informed U.S. EPA that it does not have the funding to address the Site. U.S EPA is providing $186,000 of Tronox Settlement funding to Navajo Nation Abandoned Mines Lands (NNAML) to implement the Tronox Mesa V haul shaft removal action. The settlement funding will be provided to NNAML through a multi-site cooperative agreement called the Navajo AML MSCA.

3. Weather conditions that may cause hazardous substances to migrate or be released

Rainfall events and hot/cold temperatures, including extreme weather such as monsoons, would lead to a trespasser seeking shelter in the haul shaft, which increase the threat of release into the environment. In addition, contaminants may migrate during high wind events due to the propensity for contaminants to adhere to windborne dust particles.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

U.S. EPA proposes to mitigate the release or threat or release of hazardous substances into the environment that is causing a threat to public health or welfare or the environment by taking steps to prevent exposure to the radon gas located in the Tronox Mesa V haul shaft. The removal action will include the following objectives to prevent direct human exposure to radon gas emitting from mine related waste:

- Post Signs Warning the Public/Community of the hazards associated with entering the Site.
- Construct a physical barricade designed to prevent entry into the haul shaft.
- Navajo Nation Tribal Representatives are frequently in the area of the Mesa V Haul Shaft and will perform post removal site control activities that include inspection of the barricade.

2. Contribution to remedial performance

This removal action is being conducted in concert with future removal plans. The OSC is coordinating the work being done at this Site with the remedial project manager assigned to the Mesa V Haul Shaft Site in an effort to maximize the chance that the action will compliment future actions to address the contamination at the Site. As noted above, the Site is currently not on the NPL nor proposed for the NPL.

It is expected that this removal action will mitigate release or threat of release of hazardous substances and the public health risk associated with the inhalation of hazardous substances at the Site. As discussed below, U.S. EPA expects to conduct subsequent assessments of other mine waste sites and AUMs located throughout the Navajo Nation to determine what additional response actions may be necessary.

Sources of the contamination may require long-term cleanup. In future actions, these sources may include individual Navajo AUM site cleanups. U.S. EPA will continue to coordinate with N.N.EPA to evaluate the risk of human health effects based on mine waste exposure pathways that may be present at these other AUM sites.

The construction of a physical barrier will act as an interim action to reduce the risk of exposure and warn the nearby community of the hazards associated with entering the Site and should reduce the threats described in Section III.

3. Applicable or relevant and appropriate requirements (ARARs)*

Section 300.415(j) of the NCP provides that removal actions must attain ARARs to the extent practicable considering the exigencies of the situation.

Section 300.5 of the NCP defines applicable requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal environmental or State environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility citing laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Pursuant to CERCLA section 121(e), CERCLA on-site response actions do not require permitting; only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping and enforcement are not ARARs for the CERCLA actions confined to the site.

Federal ARARs determined to be practicable for the Site are:

- Uranium Mill Tailings Radiation Control Act (40 CFR Part 192.12 subparts B and C) requirements for residential cleanup levels of tailings sands.

- Native American Graves Protection and Repatriation Act, 25 USC Section 3001 *et seq.* and its implementing regulations, 43 CFR Part 10.
- National Historic Preservation Act, 16 USC Section 470 *et seq.* and its implementing regulations, 36 CFR Part 800.
- Archeological Resources Protection Act of 1979, 16 USC Section 47000 *et seq.* and its implementing regulations, 43 CFR Part 7.
- American Indian Religious Freedom Act, 42 USC Section 1996 *et seq.*

Additional Federal policy and guidance to be considered:

- U.S. EPA Directive, Radiation Risk Assessment at CERCLA Sites: Q&A, OSWER Directive 9200$ 3,540,000.4-40, May 2014. *See* https://nepis.epa.gov/Exe/ZyPDF.cgi/P100K3TC.PDF?Dockey=P100K3TC.PDF
- U.S. EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites. Directive 9200.4040, EPA 540-R-012-13, May 2014.

*To date, the Navajo Nation has not identified additional ARARs.

4. Project schedule

It is estimated that it will take approximately 6 months to complete the construction of the physical barrier. Permanent disposal will not be included in this Action Memorandum's Scope of Work.

B. Estimated Extramural Costs

Tronox Special Account Costs	
Abandoned Mine Lands Program (AML)	$ 155,000
Extramural Costs Not Funded from the Regional Allowance	
START Contractor	$ 0
Extramural Subtotal	$ 155,000
Extramural Costs Contingency (20% of $155,000 Subtotal)	$ 31,000
TOTAL Removal Action Extramural Direct Cost Project Ceiling	**$ 186,000**

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the Site conditions, the nature of the hazardous substances documented on-site, and the potential exposure pathways to the general public and livestock seeking shelter described in Sections III and IV above, actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response

actions selected in this Action Memorandum, may continue to present a threat to public health or welfare or the environment.

VIII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues with respect to the Site that have been identified at this time.

IX. ENFORCEMENT

This removal action is being funded with Tronox settlement funding.

Estimated EPA costs for this Removal Action

U.S. EPA Direct Costs[2] (Direct Extramural [$186,000] + Direct Intramural [$ 103,000])	$ 289,000
U.S. EPA Indirect Costs: (59.70% of Direct Spending)	$ 172,533
TOTAL	$ 461,533

The total U.S. EPA extramural and intramural costs for this removal action are estimated to be $461,533.

X. U.S. EPA RECOMMENDATION

This decision document represents the selected removal action for the Tronox Mesa V Haul Shaft Site, developed in accordance with CERCLA and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Because conditions at the Site meet the NCP Section 300.415(b) criteria for a removal, EPA staff recommends the approval of the removal action proposed in this Action Memorandum. The total project ceiling if approved will be $461,533 will be funded by Tronox Special Account (A9BJ – Tronox Mesa V). Approval may be indicated by signing below.

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[2] Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual costs from this estimate will affect the United States' right to cost recovery.

Approve: _____ 10/22/18

Enrique Manzanilla, Director
Superfund Division

Date

Disapprove: _____ _____

Enrique Manzanilla, Director
Superfund Division

Date

Attachments:

I. Index to the Administrative Record
II. Site Location Map – Tronox Mesa V Mine Site
III. Tronox Mesa V Radon Report
IV. MCAP Report
V. ATSDR ToxFAQ (Radon, Uranium, and Radium)

cc: Tim Grier, U.S. EPA, HQ OEM
Dr. Donald Benn, Navajo Nation Environmental Protection Agency
Harrison Karr, Navajo Nation Department of Justice
Madeline Roanhorse, Navajo Nation Abandoned Mines Lands

bcc: H. Allen, SFD-9
W. Duncan, SFD-9
E. Poalinelli, SFD-6-2
L. Williams, ORC-3
C. Temple, SFD-9-2
Site File